MAGNITUDE 7 METALS LLC

Summary Report for ERT

METHOD 14 LINE 2

Run Number 2 | 10/20/2021 | EPA Method # 5 & 14

AVG. ALUMINUM PRODUCTION RATE	8.64	TON/HR./LINE
PROCESS DATA CORRECTION FACTOR FOR ROOF EMISSIONS FROM PART (LB/HR)	0.002475	FACTOR
PROCESS DATA CORRECTION FACTOR FOR ROOF EMISSIONS FROM FLUORIDE (LB/HR)	0.002475	FACTOR
% ISOKINETIC (MANIFOLD to ROOF)	106.4	%
% ISOKINETIC (MANIFOLD to ROOF) CORRECTION FACTOR		
TOTAL PARTICULATE COLLECTED	54.5	MG
PARTICULATE CORRECTED FOR %ISOKINETIC > 120		
SECONDARY PARTICULATE CONCENTRATION	9.46E-04	GRAINS/DSCF
SECONDARY PARTICULATE EMISSION DUCT RATE	1.19E-02	LBS./HR.
SECONDARY PARTICULATE EMISSION DUCT RATE	1.38E-03	LBS./TON
SECONDARY PARTICULATE EMISSION	41.56	LBS./HR.
SECONDARY PARTICULATE EMISSION	4.81	LBS./TON
SECONDARY PARTICULATE EMISSION USING CORRECTION FACTOR	4.81	LBS./TON
PRIMARY PARTICULATE EMITTED	1.45	LBS./TON
PRIMARY AND SECONDARY PARTICULATE EMITTED	6.26	LBS./TON
TOTAL FLUORIDE COLLECTED	21.82	MG
FLUORIDE CORRECTED FOR %ISOKINETIC > 120		
SECONDARY FLUORIDE CONCENTRATION	3.79E-04	GRAINS/SCF
SECONDARY FLUORIDE EMISSION DUCT RATE	4.77E-03	LBS./HR.
SECONDARY FLUORIDE EMISSION DUCT RATE	5.52E-04	LBS./TON
SECONDARY FLUORIDE EMISSION	16.638	LBS./HR.
SECONDARY FLUORIDE EMISSION	1.926	LBS./TON
SECONDARY TOTAL FLUORIDE EMISSION USING CORRECTION FACTOR	1.926	LBS./TON
TOTAL PRIMARY FLUORIDE EMITTED	0.218	LBS./TON
TOTAL PRIMARY AND SECONDARY FLUORIDE EMITTED	2.144	LBS./TON

MAGNITUDE 7 METALS LLC

METHOD 14 SAMPLE RESULTS

LINE 2

Run Number 2 | 10/20/2021 - 10/21/2021 | EPA Method # 5 & 14

METER VOLUME	898.325	CU. FT.
SQUARE ROOT OF DELTA P	0.363	SQ. ROOT IN. WATER
AVERAGE DELTA H	1.431	IN. WATER
METERED GAS TEMPERATURE	70.7	DEG. F
STATIC PRESSURE IN STACK	-0.71	IN. WATER
STACK TEMPERATURE	94.6	DEG. F
BAROMETRIC PRESSURE	29.75	IN. Hg
PROBE TIP DIAMETER	0.3179	INCHES
GAS METER CORRECTION FACTOR	0.996	
TOTAL SAMPLING TIME	1395.0	MINUTES
TOTAL WATER COLLECTED	308.1	GRAMS
MOLECULAR WEIGHT	28.8	LB/LB-MOLE
SAMPLING DUCT AREA	1.25	SQ. FT.
TOTAL PARTICULATE COLLECTED	54.5	MG
GASEOUS FLUORIDE COLLECTED	13.02	MG
PARTICULATE FLUORIDE COLLECTED	8.80	MG
TOTAL FLUORIDE COLLECTED	21.82	MG
AVG ALUMINUM PRODUCTION RATE	414656	LBS./DAY/LINE
MANIFOLD ANEMOMETER VELOCITY	108.6	FT./MIN.
MANIFOLD THERMOCOUPLE TEMPERATURE	115.3	DEG. F
AVERAGE ROOF EXIT VELOCITY	88.7	FT./MIN.
AVERAGE ROOF EXIT TEMPERATURE	111.5	DEG. F
VOLUMETRIC FLOWRATE OUT ROOF	5665092	ACFM/LINE
VOLUME GAS SAMPLED	888.802	SCF
MOISTURE IN STACK GAS	1.605	%
VELOCITY OF STACK GAS (ACTUAL)	1262	FT./MIN.
VOLUMETRIC FLOWRATE IN DUCT	1468	SCFM
PERCENT ISOKINETIC - TRAIN TO DUCT	98.45	%
VOLUMETRIC FLOWRATE OUT ROOF	5123543	SCFM/LINE
PERCENT ISOKINETIC - MANIFOLD TO ROOF	106.40	%
SECONDARY PARTICULATE CONCENTRATION	9.46E-04	GRAINS/SCF
SECONDARY PARTICULATE EMISSION DUCT RATE	1.19E-02	LBS./HR.
SECONDARY PARTICULATE EMISSION DUCT RATE	1.38E-03	LBS./TON
ROOF-SECONDARY PARTICULATE EMISSION	41.56	LBS./HR.
ROOF-SECONDARY PARTICULATE EMISSION	4.81	LBS./TON
PRIMARY PARTICULATE EMISSION	1.45	LBS./TON
PRIMARY AND SECONDARY PARTICULATE EMISSION	6.26	LBS./TON
SECONDARY FLUORIDE CONCENTRATION	3.79E-04	GRAINS/SCF
SECONDARY FLUORIDE EMISSION DUCT RATE	4.77E-03	LBS./HR.
SECONDARY FLUORIDE EMISSION DUCT RATE	5.52E-04	LBS./TON
ROOF-SECONDARY FLUORIDE EMISSION	16.638	LBS./HR./LINE
AVG. ALUMINUM PRODUCTION RATE	8.64	TON/HR./LINE
PROCESS DATA CORRECTION FACTOR	0.002475	
ROOF-SECONDARY FLUORIDE EMISSION	1.926	LBS./TON
PRIMARY FLUORIDE EMISSION	0.218	LBS./TON
TOTAL PRIMARY AND SECONDARY FLUORIDE EMITTED	2.144	LBS./TON

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Stack Sample Results
Raw Data Averages
METHOD 14 LINE 2

Start Date: 10/20/2021 **Stop Date:** 10/21/2021 **Run #:** 2

Traverse Point	Delta P (in. Water)	Delta H (in. Water)	Meter Temperature (in)	Meter Temperature (out)	Static Pressure (in. Water)	Stack Temperature (Deg. F)
1-1a	0.12	1.35	70	66	-0.70	71
1-1b	0.12	1.35	70	70		68
1-2a	0.14	1.50	74	69	-0.70	102
1-2b	0.14	1.50	71	75		103
1-3a	0.14	1.50	71	69	-0.73	104
1-3b	0.14	1.50	72	70		111
2-1a	0.13	1.40	71	69	-0.71	95
2-1b	0.14	1.55	72	70		92
2-2a	0.15	1.60	71	68	-0.73	100
2-2b	0.15	1.60	71	68		100
2-3a	0.14	1.50	72	73	-0.73	102
2-3b	0.15	1.60	71	70		100
3-1a	0.09	1.00	71	71	-0.68	91
3-1b	0.10	1.10	71	71		73
3-2a	0.13	1.40	71	71	-0.71	100
3-2b	0.13	1.40	71	71		98
3-3a	0.14	1.50	71	71	-0.72	99
3-3b	0.13	1.40	71	71		94
Averages	**0.363** (AVG. SQ.RT.)	**1.431**	**70.7**		**-0.71**	**94.6**

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MAGNITUDE 7 METALS LLC
METHOD 14 DATA

Run Start Date 10-20-21
Run End Date 10/21/21
Run # 2
Run Start Time ~~09:00~~ 09:05
Run End Time ~~0820~~
Probe Tip SN 3164
Avg. Tip Diameter 0.3179
Delta H **1.91** 2% Moisture
Duct Area = 1.25 sq.ft. (assumed)

Line: 1 **2** 3 East 3 West
ROOF MONITOR

Operators
Joe Schneider
Heath Conway

Digital meter used **2076**
Initial L.C. @ 15.0 = .002
Final L.C. @ 8 = 0.0
Initial Pitot L.C. = NIL
Final Pitot L.C. = NIL

POINT #	SAMP. TIME Min.	METER VOLUME Cu. Ft.	DELTA P in. H_2O	DELTA H in. H_2O	METER TEMP F IN	METER TEMP F OUT	STATIC PRESS. in. H_2O	STACK TEMP. ° F	IMP. TEMP. ° F	HOT BOX TEMP. ° F	PUMP VAC. in. Hg	SET PT.
1-1	155	418.600	.12	1.35	70	66	-.70	71	76	155	.6	11.27
			.12	1.35	70	70		68	64	155	.6	11.37
1-2	155	515.270	.14	1.50	74	69	-.70	~~102~~	~~89~~	155	.6	10.73
			.14	1.50	71	75		103	65	155	.6	10.73
1-3	155	613.550	.14	1.50	71	69	-.73	104	65	155	.6	10.65
			.14	1.50	72	70		111	66	155	1.0	10.53
2-1	155	717.645	.13	1.40	71	69	-.71	95	65	155	1.0	10.82
			.14	1.55	72	70		92	66	155	1.2	10.80
2-2	155	820.415	.15	1.60	71	68	-.73	100	64	155	1.2	10.71
			.15	1.60	71	68		100	64	155	1.2	10.71
2-3	155	924.630	.14	1.50	72	73	-.73	102	65	155	1.2	10.74
			.15	1.60	71	70		100	66	155	1.2	10.73
3-1	155	030.580	.09	1.00	71	71	-.68	91	66	155	1.2	10.91
			.10	1.10	71	71		73	65	155	1.5	11.28
3-2	155	116.110	.13	1.40	71	71	-.71	100	66	155	1.5	10.74
			.13	1.40	71	71		98	65	155	1.5	10.78
3-3	155	213.980	.14	1.50	71	71	-.72	99	66	156	1.5	10.76
			.13	~~1.40~~ 1.40	71	71		94	65	155	1.5	~~10.85~~ 10.85
FINAL		316.925		1.40								10.85
S/N		16895913					**76**	3-7	**2-A**	**2-H**		

Nomograph factor: 11.33

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MAGNITUDE 7 METALS LLC
METHOD 14 RAW DATA

Line: 2 Start Date: 10-20-21 Run: 2 Filter: 2C

PITOT TUBE N 7141
SN ~~D755~~
Visually inspected? (Yes)
Circle to document visual inspection.

PROBE TIP
SN 3164

DIAMETER MEASUREMENT (in.)

1. _____
2. _____
3. _____
4. AVG
5. 3.179
6. _____
7. _____
8. _____

If previous calibration referenced, circle (Yes) to document visual inspection.

Out of round max. 0.004 in.
CAL. BY: _____
CALIPER: MITUTOYO S/N 7002015
NORANDA 0.5"
THICKNESS STD # 1 _____

SAMPLER OPERATION

PROBE HEAT SETTING	HEATER BOX SETTING
248 deg. F. +/- 25 deg. F.	For Method 13
Range: 223 - 273 deg. F.	165 deg. F. +/- 15 deg. F.
	Range: 150 - 180 deg. F.
	For Method 315
	248 deg. F. +/- 25 deg. F.
	Range: 223 - 273 deg. F.

BAROMETER READING 29.89 (in. Hg)
CORRECTION FACTOR -.14 (in. Hg)

For Method 13 only:

ORIGINAL GASEOUS
FLUORIDE SAMPLE VOLUME 2 (liter)

		INITIAL WEIGHT	FINAL WEIGHT
IMPINGER #	+ 200 ml water	840.1	888.1
IMPINGER #	+ 100 ml water	749.5	801.0
IMPINGER #	+ EMPTY	639.7	659.3
IMPINGER #	+ SILICA GEL	1588.8	1777.8
IMPINGER #	+ SILICA GEL		
IMPINGER #	+ SILICA GEL		

BALANCE: METTLER PJ6000 SNR K59603 WEIGHED BY: DC
2 Kg Class S-1 Calibration Wt. 1999.9 Balance check must be +/- 0.5 grams.
COMMENTS: _____

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Magnitude 7 Metals LLC

GAS ANALYSIS REPORT

Location PL2 Date 10/20/21

Run 2

Room C Analyzed by JS

Run	Time	Percent Carbon Dioxide (CO_2)	Percent Oxygen (O_2)
1	12:30	.04	20.9
2	12:35	.02	20.9
3	12:40	.02	20.9

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Potline 2 Roof Exit Velocities and Temperatures

Manifold (C-66) Averages		Roof Averages	
WS (ft/min)	Temp (Deg. F)	WS (ft/min)	Temp (Deg. F)
108.6	115.3	88.7	111.5

	C-51			C-66			C-82		
Date/Time	WS (ft/min)	WD (Deg.)	Temp (Deg. F	WS (ft/min)	WD (Deg.)	Temp (Deg. F	WS (ft/min)	WD (Deg.)	Temp (Deg. F)
	_WS_AV	_WD_AV	_TEMP_	_WS_AV	_WD_AV	_TEMP_	_WS_AV	_WD_AV	_TEMP_
Averages:	64.4	170.0	111.5	108.6	128.1	115.3	93.0	129.2	107.6
10/20/21 9:05	65.0	178.5	101.6	107.7	130.6	104.9	84.1	132.5	94.9
10/20/21 9:20	65.9	169.9	101.4	101.3	126.9	106.0	88.9	128.4	96.6
10/20/21 9:35	62.8	174.1	101.3	118.6	134.2	107.8	90.2	133.4	98.9
10/20/21 9:50	71.9	169.5	103.3	116.7	129.1	107.8	93.6	128.0	100.4
10/20/21 10:05	76.8	170.3	104.1	142.1	135.8	111.0	99.8	133.3	101.8
10/20/21 10:20	74.9	174.1	103.6	126.9	134.7	111.2	87.5	127.0	103.8
10/20/21 10:35	71.4	163.9	109.4	111.2	126.7	111.4	87.3	121.5	103.8
10/20/21 10:50	73.2	160.5	111.8	117.3	129.5	114.0	90.2	123.8	105.3
10/20/21 11:05	67.3	164.6	113.5	109.7	129.3	114.0	90.2	124.1	106.1
10/20/21 11:20	72.3	161.3	114.1	103.0	127.4	116.8	84.0	123.4	107.5
10/20/21 11:35	65.0	170.6	113.0	105.9	127.1	116.0	86.4	123.3	108.2
10/20/21 11:50	67.5	168.4	115.0	107.0	129.8	117.0	87.6	122.3	108.3
10/20/21 12:05	67.7	167.1	115.0	104.6	126.0	116.9	85.0	126.2	109.6
10/20/21 12:20	63.7	175.0	116.3	93.3	121.1	117.5	83.2	120.2	109.0
10/20/21 12:35	61.1	165.7	114.7	107.3	125.0	118.2	83.2	121.2	110.3
10/20/21 12:50	68.4	163.9	115.9	95.5	125.4	118.4	82.4	125.7	111.8
10/20/21 13:05	70.2	168.0	114.4	100.9	124.4	118.5	88.3	121.3	111.8
10/20/21 13:20	72.9	162.6	115.8	98.2	123.4	118.6	79.6	123.5	112.9
10/20/21 13:35	66.1	156.7	115.9	108.9	125.9	120.1	88.6	129.2	110.1
10/20/21 13:50	63.5	161.3	115.9	92.6	121.0	119.1	84.7	125.4	112.6
10/20/21 14:05	64.3	171.5	116.0	95.3	121.0	119.1	81.0	123.7	112.1
10/20/21 14:20	72.4	159.6	116.0	103.8	121.0	119.1	82.4	123.3	113.7
10/20/21 14:35	63.3	159.6	118.0	98.1	122.5	120.1	93.5	127.7	113.7
10/20/21 14:50	73.1	162.6	119.8	109.8	126.0	121.9	83.5	125.9	114.0
10/20/21 15:05	69.1	169.0	119.7	105.8	126.2	120.5	88.0	125.8	113.8
10/20/21 15:20	72.9	174.0	119.0	119.2	131.0	122.2	92.5	130.5	114.5
10/20/21 15:35	73.7	163.7	117.6	104.7	125.0	120.6	84.6	125.5	112.1
10/20/21 15:50	69.0	172.1	118.7	107.5	125.7	120.7	86.8	123.0	109.2
10/20/21 16:05	64.0	167.8	116.5	107.2	125.5	120.8	83.1	126.3	110.1
10/20/21 16:20	73.2	178.8	117.0	90.9	122.8	117.5	88.3	127.3	110.9
10/20/21 16:35	75.9	172.7	115.3	89.1	124.7	114.3	94.5	127.4	109.1
10/20/21 16:50	73.8	184.9	115.5	103.5	127.3	113.8	92.5	124.1	108.6
10/20/21 17:05	64.4	171.5	117.8	91.9	125.5	116.3	90.4	125.3	107.3
10/20/21 17:20	57.4	175.8	116.9	85.6	127.4	118.7	86.3	126.5	107.9
10/20/21 17:35	58.2	181.4	117.0	96.0	124.8	118.8	86.1	131.4	109.1
10/20/21 17:50	68.9	163.2	116.0	93.8	131.3	117.7	92.3	130.4	108.0
10/20/21 18:05	73.8	173.1	114.0	99.4	131.4	116.9	87.5	127.4	108.1
10/20/21 18:20	75.1	176.0	113.9	94.4	132.3	116.8	88.4	127.4	108.5
10/20/21 18:35	78.0	177.8	113.8	100.7	135.4	116.8	91.1	128.9	108.4
10/20/21 18:50	72.7	183.6	112.6	102.3	136.5	115.4	99.2	130.9	108.3
10/20/21 19:05	71.2	180.8	111.5	104.0	136.7	114.2	102.6	133.5	107.5
10/20/21 19:20	64.9	190.6	110.7	119.9	138.6	113.4	109.9	134.4	107.0
10/20/21 19:35	67.3	192.1	110.6	119.3	136.0	112.4	111.5	132.9	105.5
10/20/21 19:50	53.5	189.7	110.5	127.0	141.6	112.9	110.7	130.9	105.3
10/20/21 20:05	56.9	183.0	110.3	115.0	139.7	113.8	107.5	132.1	105.1
10/20/21 20:20	54.5	185.9	110.7	113.4	137.9	113.7	104.6	130.2	104.3

	C-51			C-66			C-82		
Date/Time	WS (ft/min)	WD (Deg.)	Temp (Deg. F	WS (ft/min)	WD (Deg.)	Temp (Deg. F	WS (ft/min)	WD (Deg.)	Temp (Deg. F)
10/20/21 20:35	64.9	184.4	111.6	116.6	135.1	115.1	110.6	146.0	107.1
10/20/21 20:50	56.0	181.5	111.8	104.7	123.4	117.0	94.3	142.5	109.0
10/20/21 21:05	64.1	181.6	111.1	106.7	129.8	115.9	108.5	143.5	107.7
10/20/21 21:20	53.8	174.8	110.5	99.3	128.3	115.3	104.1	146.4	107.6
10/20/21 21:35	66.4	163.3	110.4	107.4	126.7	114.6	98.0	142.4	108.5
10/20/21 21:50	67.4	163.5	110.2	107.6	127.5	114.6	108.7	143.9	107.2
10/20/21 22:05	64.5	163.6	110.0	124.1	130.6	114.5	102.5	143.8	107.7
10/20/21 22:20	61.3	168.2	110.1	121.5	133.4	114.5	105.2	148.0	106.9
10/20/21 22:35	53.6	173.0	109.7	107.7	123.9	114.4	99.5	141.8	106.9
10/20/21 22:50	56.6	173.0	108.6	131.7	131.4	113.6	102.4	142.0	106.1
10/20/21 23:05	56.8	174.5	108.6	126.5	129.5	113.5	96.4	142.9	106.9
10/20/21 23:20	58.6	158.6	107.9	132.6	130.6	112.8	108.8	144.7	106.7
10/20/21 23:35	56.9	165.5	107.9	126.1	129.3	112.6	117.9	145.0	108.1
10/20/21 23:50	57.2	166.7	107.9	130.2	129.3	112.4	103.8	141.3	108.6
10/21/21 0:05	59.6	160.9	107.9	125.1	125.6	112.4	113.0	140.9	109.0
10/21/21 0:20	55.7	155.1	107.8	129.7	127.9	112.4	110.1	147.8	108.5
10/21/21 0:35	58.7	152.9	107.6	129.5	128.6	112.4	117.9	144.7	107.0
10/21/21 0:50	63.6	152.6	108.4	112.4	123.6	113.6	96.8	131.4	106.1
10/21/21 1:05	63.6	169.8	109.8	101.4	125.5	114.2	85.7	126.8	107.2
10/21/21 1:20	68.3	169.7	111.2	105.2	124.6	115.0	78.3	123.5	108.8
10/21/21 1:35	72.4	163.4	111.8	108.4	124.8	116.8	84.7	121.9	108.0
10/21/21 1:50	73.2	164.4	112.8	107.8	127.0	116.7	82.4	121.6	108.1
10/21/21 2:05	66.8	168.0	112.4	105.6	125.3	116.7	82.5	119.6	108.1
10/21/21 2:20	66.9	170.7	111.7	112.8	126.4	116.6	90.2	122.9	106.4
10/21/21 2:35	68.2	167.1	111.3	96.3	123.9	115.2	76.5	125.4	107.1
10/21/21 2:50	67.0	169.3	111.3	107.7	124.0	115.1	88.4	120.7	107.1
10/21/21 3:05	69.6	165.6	111.3	112.4	126.7	114.4	88.4	121.5	107.0
10/21/21 3:20	69.2	173.6	110.8	104.4	122.8	115.3	83.6	122.3	107.7
10/21/21 3:35	68.9	167.3	111.3	106.7	126.5	115.9	88.3	120.9	106.3
10/21/21 3:50	72.5	162.6	111.3	108.1	126.6	114.8	91.0	122.6	106.1
10/21/21 4:05	66.9	172.6	112.9	114.2	126.6	117.5	87.8	122.4	107.6
10/21/21 4:20	65.7	174.7	112.9	103.9	123.8	116.9	89.2	122.3	107.5
10/21/21 4:35	71.2	174.7	112.2	104.5	124.1	117.0	92.6	124.6	107.5
10/21/21 4:50	67.4	168.9	111.7	107.1	124.4	116.2	95.1	124.5	107.4
10/21/21 5:05	55.9	161.2	110.9	108.9	126.6	116.8	94.9	124.4	107.3
10/21/21 5:20	56.9	168.8	110.3	103.3	126.7	116.2	92.2	124.4	106.8
10/21/21 5:35	57.0	164.0	109.8	107.5	126.7	116.4	99.0	128.4	106.9
10/21/21 5:50	48.7	188.1	108.9	100.2	124.4	116.1	90.7	126.6	107.0
10/21/21 6:05	55.3	166.6	109.3	99.5	126.4	116.2	83.8	121.9	106.2
10/21/21 6:20	48.7	181.5	108.0	90.1	124.7	114.7	85.2	130.7	107.1
10/21/21 6:35	46.4	183.7	108.0	93.0	123.9	114.5	92.5	125.7	106.5
10/21/21 6:50	46.4	191.5	108.0	90.3	125.4	115.1	90.5	124.6	105.9
10/21/21 7:05	49.8	167.0	108.1	100.7	129.2	114.1	93.2	127.3	107.2
10/21/21 7:20	51.7	165.2	107.0	110.2	131.4	113.1	90.2	124.1	107.9
10/21/21 7:35	63.1	152.9	105.9	120.9	131.1	111.9	92.4	121.8	107.4
10/21/21 7:50	63.0	150.9	105.9	120.9	130.8	111.4	98.0	123.1	106.6
10/21/21 8:05	60.1	154.1	105.8	126.7	132.7	111.3	96.9	125.9	106.5
10/21/21 8:20	51.9	162.6	105.7	121.3	136.7	112.0	94.2	128.7	107.3